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TRANSLATED
FROM
NORWEGIAN.

Professor Dr. J. C. Branner
with compliments of
G. Henriksen.

ON THE IRON ORE DEPOSITS

IN

SYDVARANGER

FINMARKEN - NORWAY

AND

RELATIVE GEOLOGICAL PROBLEMS.

TELEGRAM SENT FROM VARDØ OCTOBER 1st 1902
TO THE NEWSPAPERS IN CHRISTIANIA
»MORGENBLADET«, »AFTENPOSTEN« AND »VERDENS GANG«.

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J. C. Branner

Vardø October 1st 1902.

AT the request of the Norwegian government, the undersigned, from the 15th to the 28th of September, inspected the iron ore deposits in Sydvaranger, belonging to Mr. Anker.

Mr. Anker has over 400 claims on the iron-ore. The whole summer his agents have been engaged in finding and taking claims, so that no developing work has as yet been carried out. There is no doubt that there are here immense quantities of ferruginous material. A quantity of from 50 to 100 million tons would probably not be too high an estimate. The question whether any or how much of this ore can be worked to advantage, under prevailing circumstances, can only be determined by further investigations, and these will take considerable time, and cost much money.

The ore is schistose, the same as in Dunderland, and is formed here in alternating thin layers of magnetite, hornblende and quartz. Besides being in independent layers the hornblende also occurs intermixed with the magnetite-layers. The iron contained in the hornblende, which will increase the percentage of iron, as given by the assays, will probably be lost in concentration and smelting. The ore according to assays already made is practically free from detrimental substances, that is to say phosphorus, titanium and sulphur.

The iron-deposits in Sydvaranger have been formed by the compression of gabbro-rocks, which together with other kinds of rock, chiefly grey gneiss, is found in ridges which one can follow for kilometers. Mr. Anker's claims refer to an aggregate length of 40 kilometers along the ridges. Where the compression has been less accentuated, or where the gabbro has been less ferruginous, as a rule only hornblende and quartz have been formed. The value of the lodes therefore varies considerably. The ore is partly found as smaller pressure zones within the gabbro, but mostly in large masses where the iron in the gabbro has often been separated out into iron-ore by pressure for long distances. In some places it appears, as though the quartz had by pressure been entirely isolated, so that it is found lying up against the iron-ore strata as thick bands of quartzite. One could expect to find here the best iron-ore.

As in Dunderland so in Sydvaranger all the ore must be mechanically concentrated. Shipping facilities are about the same as in Dunderland. The most natural place for export presumably will be Kirkenæs. The freight will be higher from Sydvaranger than from Dunderland.

Within the ferruginous district in Sydvaranger, which topographically and geologically has much in common with the ferruginous locality at Arendal, the ore seems to be the best near the Northern and Southern boundaries. The Southern lode near Lille Langvand lake is difficult of access; but furthest to the North one has from Melli Javre (a little lake about 3 kilometers from Sandnæs, 5 kilometers from Boris Gleb and 3 kilometers from the Russian frontier) in a Southern direction down to the Bjørnevand lake two large deposits forming together a Roman figure V with its apex by Melli Javre (translated soup lake). These deposits look the most promising and at the same time are easiest of access, there being no difficulty in building a railway 10 kilometers long down to Kirkenæs. The ore here has a width of 50 meters and more; sometimes much more. As the lodes are apt to be cut off abruptly by joints or to pass into gabbro, it is uncertain to what depth the Sydvaranger iron-deposits will go down. Probably this depth will greatly vary in different places. The ore consists exclusively of magnetite. Hematite has not been found in the district. Lime does not occur in the Sydvaranger ore, nor have ledges of lime been found within the ferruginous district. Possibly lime-stone might be found under the marshes and lakes. Also it is not impossible that in such covered ground surprises in the shape of ore deposits different from those yet found, might be encountered.

Comparing what I have seen in Sydvaranger with other observations that I have made in Finmarken before, also at many other places in our country and abroad, notably within the Huronian formation in Canada and in the Italian Alpine regions, I arrive at the following conclusions;

The iron-ore deposits in Dunderland, the belts of marble in the North of Norway and of dolomite in Finmarken are due to differentiation of eruptives by compression. Also the ore-deposits of Røros, Viksnæs, Sulitjelma, Rio Tinto, Kongsberg, Åmmeberg, the Norwegian and Canadian nickel deposits, the large iron-ore deposits by Lake Superior, blanket deposits, many socalled conglomerates (among others Witwatersrand banket in Transvaal), and a multitude of other ore deposits all over the world have been formed as a result of effects of pressure within eruptives. Ores have a tendency to segregate on the contact of two different rocks differentiating out by pressure (instances: Skuterud cobalt mines at Modum, Dalane in Telemarken), also by changes in the force of the compression (instances: the Røros copper mines and many nickel mines at Sudbury), by irregularities in the direction of the compression and consequent folding (instances: saddle reefs in Australia and Nova Scotia, many of the iron-occurrences by Lake Superior), by two crossing directions of compression (instances: the Flåt nickel mine at Evje and Mr. Schjølberg's Hopen højfjeld copper mine which are besides both contact deposits), in pressure-zones, sheared zones, within basic eruptives (instances: several of the copper-glance deposits in Lemmivara and Lottivara in Laxelv in Finmarken, Monte Catini in Tuscany).

Fenno-Scandia's socalled basal or fundamental rock, »urgebirge«, consists of eruptives more or less compressed and is younger than the surrounding formations, younger than the Silurian by Christiania, than the porphyry in Kolsås, than the socalled Norwegian mountain formations, than the pressed eruptives of which the Varanger peninsula to a great extent consists. This large eruptive field, in which both magmatic differentiation and differentiation by compression have played a large part, has a relatively basic and metal-rich border zone. For this reason there are chances of finding ore deposits on the Murman coast in Russia, also that the projected Swedish inland trunk railway will get considerable traffic from mining industry. Such a relatively basic and metal-rich border-zone is found for instance at Tyristränden, down through Modum, Eker and Sandsvær; further in Bamle. The coast round Arendal is perhaps in such a border-zone, adjoining differing formations under the sea.

Sparagmites are eruptives in a special form brought about by special conditions, probably also by effects of pressure. Gabbro-rocks on differentiation by compression generally give hornblende schists or chlorite schists and quartzite (in many cases the latter has in Norway received the name »blue quartz«) and thirdly often belts of dolomite.

At the platinum-occurence at Våland in Holt bands of serpentiniferous and graphitic limestone are found forming one of the rocks separated out by the differentiation of gabbro by pressure.

In Dunderland the differentiation by compression is universal, while in Syd Varanger the effects of pressure are of more local character. On this account one can rely with much greater certainty on the ore continuing to a very considerable depth in the first named place.

G. HENRIKSEN
INSPECTOR OF MINES
CHRISTIANIA.

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